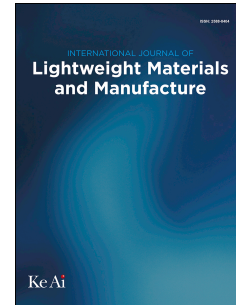


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A review on forming techniques for manufacturing lightweight complex—shaped aluminium panel components

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Abstract

Aluminium alloys are being increasingly utilised in the automotive and aerospace industries to reduce the weight of vehicles. Extensive research has been conducted to overcome the poor ductility of aluminium alloys at room temperature and improve formability of the materials, to enable complex-shaped panel components to be manufactured. To this end, this paper contains a comprehensive review of widely used forming processes for aluminium alloys, under cold, warm and hot forming conditions, and the material characteristics and equipment used for each process. Based on a detailed analysis from the view of industrial requirements, recent progress in experimentation techniques are reviewed addressing the limitations and improvements of specific forming processes. Furthermore, material modelling methods at both cold and elevated temperature forming conditions have been presented. In addition, finite element (FE) simulations with the implementation of material models are discussed. This review article intends to provide a systematic guide for process designers to choose the most appropriate sheet forming technique for specific industrial applications.

Keywords: Aluminium alloys, forming, complex-shaped, panel components, modelling

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